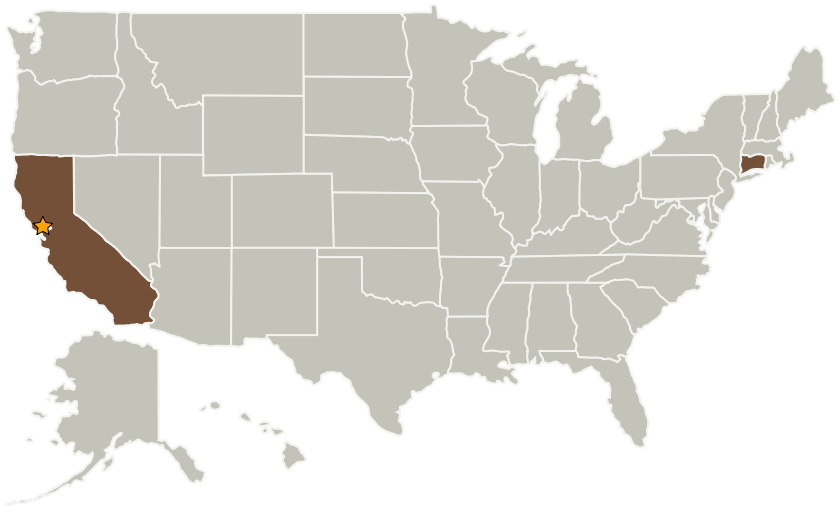
Automated Fault Diagnostics, Prognostics, and Recovery in Spacecraft Power Systems, Phase II

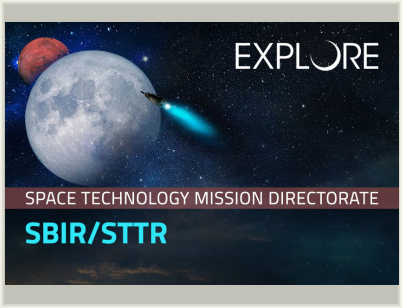
Completed Technology Project (2008 - 2010)

Project Introduction

Fault detection and isolation (FDI) in spacecraft's electrical power system (EPS) has always received special attention. However, the power systems health management techniques have generally been limited to the energy sources and storage elements. Furthermore, these functions have been performed off-line by mission planners for the sole purpose of estimating future energy availability and effective device lifetime. As new programs and vehicles developed for space exploration, degradation analysis and prognostics in spacecraft EPS are becoming key issues for safety and success of these missions. QSI propose a novel approach to utilize ISHM decisions to estimate power generation, storage and delivery capabilities, and subsequently using the information for generating optimal reactive mission plans to maximize the mission success probability. The key innovations in the proposed effort are 1). Utilization of diagnostic, prognostic, and recovery decisions to estimate the power supply capability of a spacecraft EPS and assess its reliability; 2). Development of an automated process to optimally utilize the available power supply capability with consideration for maximizing mission success probability; 3). Generation of optimal reconfiguration options and concomitant control actions for spacecraft EPS by using the onboard reactive planner and universal executive.

Primary U.S. Work Locations and Key Partners





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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Ames Research Center (ARC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Ames Research Center(ARC)	Lead Organization	NASA Center	Moffett Field, California
Qualtech Systems, Inc.	Supporting Organization	Industry Minority-Owned Business, Small Disadvantaged Business (SDB)	Rocky Hill, Connecticut

Primary U.S. Work Locations	
California	Connecticut

Project Transitions

February 2008: Project Start

February 2010: Closed out

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
  - TX03.3 Power Management and Distribution
    - TX03.3.1 Management and Control